Functions

truss_kl

```
function [kl] = truss_kl(i)
%
% This function forms the element stiffness matrix in local coordinates
%
global geom connec prop
%
% retrieve the nodes of element i
%
node_1=connec(i,1);
node_2=connec(i,2);
%
% Retrieve the x and y coordinates of nodes 1 and 2
%
x1=geom(node_1,1); y1=geom(node_1,2);
x2=geom(node_2,1); y2=geom(node_2,2);
%
% Evaluate length of element i
%
L=sqrt((x2-x1)^2 + (y2-y1)^2);
%
% Retrieve section properties of element i
%
E=prop(i,1); A=prop(i,2);
%
% Calculate element stiffness matrix in its local coordinates
%
kl=[E*A/L 0 -E*A/L 0 ; ...
    0 0 0 0 ; ...
    -E*A/L 0 E*A/L 0 ; ...
    0 0 0 0 ];
end
```

truss_C

```
function [C]=truss_C(i)
%
% This function forms the transformation between local and global coordinates
%
global geom connec
%
% retrieve the nodes of element i
%
node_1=connec(i,1);
node_2=connec(i,2);
%
```

```
% Retrieve the x and y coordinates of nodes 1 and 2
%
x1=geom(node_1,1); y1=geom(node_1,2);
x2=geom(node_2,1); y2=geom(node_2,2);
%
% Evaluate the angle that the member makes with the global axis X
%
    if(x2-x1)==0
        if(y2>y1)
            theta=2*atan(1);
        else
            theta=-2*atan(1);
        end
    else
        theta=atan((y2-y1)/(x2-x1));
    end
%
% Construct the transformation matrix
%
C = [cos(theta) -sin(theta) 0 0; ...
    sin(theta) cos(theta) 0 0; ...
    0 0 cos(theta) -sin(theta); ...
    0 0 sin(theta) cos(theta) ];
%
end
```

truss_g

```
function [g]=truss_g(i)
%
% This function forms the steering vector for element i
%
global connec nf
%
% retrieve the nodes of element i
%
node_1=connec(i,1);
node_2=connec(i,2);
%
% Form the steering vector from element s degrees of freedom
%
g=[nf(node_1,1); nf(node_1,2); nf(node_2,1); nf(node_2,2)];
%
end
```

form_KK

```
function[KK]=form_KK(KK, kg, g)
%
% This function assembles the global stiffness matrix
```

```
%
global eldof
%
% This function assembles the global stiffness matrix
%
for i=1:eldof
    if g(i) ~= 0
        for j=1:eldof
            if g(j) ~= 0
                KK(g(i),g(j))= KK(g(i),g(j)) + kg(i,j);
            end
        end
    end
end

end
```

form_truss_F

```
function [F] = form_truss_F(F)
%
% This function forms the global force vector
%
global nnd nodof nf load
%
for i=1:nnd
    for j=1:nodof
        if nf(i,j)~= 0
            F(nf(i,j)) = load(i,j);
        end
    end
end

end
```